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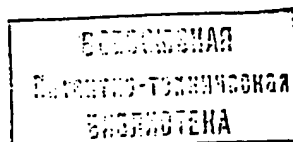
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PATENTS ACT, 1949  
AMENDED SPECIFICATION

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PATENT SPECIFICATION

871 661

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DRAWINGS ATTACHED

*Inventor:* NORMAN PETER MANN

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COMPLETE SPECIFICATION

An improved Face Mask

We, ROBINSON & SONS LIMITED of Wheat Bridge Mills, Chesterfield, Derbyshire, a British Company, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to a disposable face mask. Face masks used by surgeons and nurses, are normally made from several layers of woven cotton gauze, or muslin, and may or may not include an impervious insert of, for example the material sold under the Registered Trade Mark "Cellophane", or some such cellulose acetate film. The masks are worn by surgeons and nurses during surgical operations; when examining or dressing wounds; when preparing dressing and dressing trolleys; while attending to surgical ear, nose and throat patients and puerpal patients; during outbreaks of respiratory infection; and whilst attending to infants or preparing their feeds, etc. They should also be worn by visitors to infants in maternity wards, and by nursing mothers whilst breast feeding. The object is to prevent the spread of droplet-borne infection from the respiratory tract.

Masks of this type, after each period of wearing, are normally placed first in a container of liquid antiseptic, then boiled, laundered and finally sterilised before re-issue, and so are used several times before being destroyed.

It is the intention of this invention to provide a face mask which, while possessing the [Price 25p]

necessary qualities which make it suitable for preventing the spread of droplet infection, is made from such materials as to render it sufficiently inexpensive to be used once only and then destroyed. By this practice all risk of possible cross-infection is avoided. The use of such disposable masks would obviate the necessity of boiling and laundering, and such masks would be eminently suitable for wear during the application of dressings and general attention to patients, etc. In addition the low cost would encourage the wearing of such masks by visitors to maternity wards, this being desirable as carriers of staphylococcal infection harbour the infection in the respiratory tract and, whilst the nursing staffs normally wear face masks whilst attending to infants, visitors not wearing masks may frequently introduce the infection via mothers to babies.

Disposable face masks as described would be suitable for wear by the general public during such weather conditions as heavy fog, "Smog" etc., and particularly by persons who suffer from such complaints as asthma and bronchitis.

The present invention provides a disposable face mask, comprising sheet material folded to form a box pleat such that the mask lies flat for packing but can be opened out from its flat condition to an operative condition in which it assumes a boat shape and is adapted to cover the nostrils and mouth and to extend under the chin of the wearer, and having means at the end of the "boat" for attaching it to the head of the wearer, which sheet material comprises a sheet of wet-strengthened

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paper or non-woven fabric possessing adequate strength and porosity with, if desired, an open mesh reinforcement. Specifically the sheet material should possess the necessary tensile and burst strengths in both wet and dry conditions and should have a porosity such that it will not unduly restrict breathing:—in other words it will give a reasonable air flow at a low pressure difference between the two surfaces of the material.

The expression "non-woven" fabric is employed herein to mean a bonded fibre fabric consisting of a web of natural or man-made fibres secured together by a bonding agent or by the incorporation, in the web, of fibres (e.g. cellulose acetate or other thermoplastic fibres) which can be caused to adhere by heat or solvents.

The bonding agent may be applied throughout the web or in pattern, for example in stripes, which may run transverse to the general direction of the length of the fibres. Non-woven fabrics are conveniently manufactured by producing a more or less continuous web of loosely associated textile fibres disposed in sheet form (using any of a variety of procedures) and then bonding the sheet or web to anchor or bond the individual fibres together. The first stage in the manufacturing process

is the formation of a web by arranging the fibres in a uniform pattern. This pattern can be altered to obtain varying characteristics in the final product. The second stage is the bonding together of the fibres by impregnating them with a suitable bonding agent. The chief bonding agents are regenerated cellulose, solutions or emulsions of polymeric substances, e.g. polyvinyl acetate, or rubber, or cellulose acetate.

Desirably the sheet material consists wholly or mainly of the said paper or non-woven fabric. It may comprise a reinforcement of an open mesh textile web formed of interlaced threads.

Preferably the said paper or non-woven fabric has a wet-burst strength of not less than 8lbs per sq. in. and an air porosity of not less than 100 cu. ft./sq. ft./min. under a pressure of 0.5 in. water gauge.

A suitable wet strengthened paper is sold under the registered Trade Mark ELTOLINE (being composed of 100% Manilla hemp fibre).

A comparison of the physical properties of a suitable non-woven fabric and a suitable wet strengthened paper sold under the registered Trade Mark ELTOLINE is given in the following Table:—

	Non-woven fabric	"Eltoline"
Weight — ozs./sq. yd.	1.0	0.7
Thickness — ins.	0.006	0.0036
Tensile strength (Lbs./inch)		
Lengthwise	12	13 — 17
Crosswise	3	10 — 11.4
Bursting strength (Lbs/sq. ins.) as measured by a method attributed to Schoffer		
Dry	15	17 — 28
Wet		10 — 15
Air Porosity (cub. ft./sq. ft./min.) 0.5 ins. W.g.	173	120 — 170
Pressure Difference (ins. W.g.) at 30 Litres/42.25 sq. cms./min.	0.08	0.135

The mask desirably consists of a single sheet of wet strengthened paper or non-woven fabric box—pleated so as to be capable of assuming a boat shape, and the means at the end of the "boat" for attaching it to the head of the wearer may consist of loops to pass round the ears, or cords or the like to extend round, or be tied around, the head.

Desirably, the mask has means at two opposite ends for securing the pleat or fold:—i.e. for hindering it from opening out at these ends. Such means may consist of adhesive or sewing.

The mask of the invention is suitably made by folding an initially-oblong sheet of wet strengthened paper or non-woven fabric, possessing adequate strength and porosity,

along its length and fastening it, at its ends, in folded condition to form a box pleat which is capable of assuming a boat shape covering the nostrils, mouth, and chin of the wearer, means such as cords or looped cords being provided at said ends to attach the mask to the head of the wearer. The cords or looped cords are most securely attached to the sheet material if they are attached along its long edges.

In order that the invention may be better understood, one specific example will now be described with reference to the accompanying drawings in which:—

Figure 1 illustrate the face mask in position on a human head;

Figure 2 is a plan view of the mask in its flat condition (in which it is sold and stored preparatory to use) and,

Figure 3 is a cross section taken on the line III—III in Figure 2.

In a specific example the disposable face mask 10 is made from a single sheet of the aforesaid paper or non-woven fabric which initially is oblong in form. This sheet is folded longitudinally at two spaced regions 11 and 12 so as to provide a marginal part 13a or 13b extending inwards of each long edge to an outward fold 14a or 14b, a narrower part 15a or 15b extending outwards (i.e. towards the first mentioned edge) from that fold to a reverse fold 16a or 16b, and a central part 17 extending between the reverse folds 16a and 16b. In other words the folds produce a relatively wide box pleat 18 in which the two outward folds 14a and 14b are spaced apart at the back of the pleat. Means are provided whereby the box pleat 18 is prevented from opening at its two ends, and it is to be understood that with the box pleat wholly unopened the pleated sheet lies flat so that a great number of the masks may be packed in a very small bulk. However, since the box pleat may be expanded otherwise than at the two ends, the material can thus assume a boat shape and is therefore adapted, when held over the face of the user with the box pleat extending in a generally horizontal direction, to cover the nostrils and mouth of the user and also to extend beneath the chin as shown in Figure 1. The means by which the ends of the pleat are prevented from opening may consist of an overlocking or binding 19 of a textile thread which is applied along the two ends of the material (so as to stitch the overlapping portions of the box pleat together) and round the corners and for a short distance along each of the longitudinal edges of the material. This overlocking may be employed to secure ear loops 20a, 20b to the material. Each ear

loop consists of an extensible (elastic) cord, the ends of which are secured to the longitudinal edges of the material, as at 21 by the said overlocking. The cord may consist of covered elastic. The mask may be treated with an antiseptic (e.g. that sold under the registered Trade Mark "HIBITANE").

#### WHAT WE CLAIM IS:—

1. A disposable face mask, comprising sheet material folded to form a box pleat such that the mask lies flat for packing but can be opened out from its flat condition to an operative condition in which it assumes a boat shape and is adapted to cover the nostrils and mouth and to extend under the chin of the wearer, and having means at the ends of the "boat" for attaching to the head of the wearer, which sheet material comprises a sheet of wet-strengthened paper or non-woven fabric possessing adequate strength and porosity with, if desired, an open mesh reinforcement.

2. A face mask according to claim 1, wherein the said paper or non-woven fabric has a wet-burst strength of not less than 8lbs per sq. in. and an air porosity of not less than 100 cu. ft./sq. ft./min under a pressure of 0.5 in. water gauge.

3. A face mask according to Claim 1 or Claim 2, having means at two opposite ends of the mask for securing the mask in pleated or folded condition.

4. A face mask according to any preceding Claim, wherein the means for attaching the mask to the head of the wearer consists of loops to pass round the ears, or cords or the like to extend round, or be tied around, the head.

5. A face mask according to Claim 4, having elastic ear loops.

6. A disposable face mask, according to any preceding claim, comprising an initially-oblong sheet of wet strengthened paper or non-woven fabric which is folded along its length and, at its ends, is fastened in folded condition.

7. A face mask according to Claim 6 as dependent upon Claim 4 having the cords or looped cords attached to the sheet material along the long edges of the latter.

8. A face mask according to any of the preceding claims, treated with an antiseptic.

9. A disposable face mask according to any of the preceding claims, made of wet strengthened paper or non-woven fabric having the physical properties specified in the Table.

10. A disposable face mask, substantially as described herein.

ERIC POTTER AND CLARKSON,  
Chartered Patent Agents.

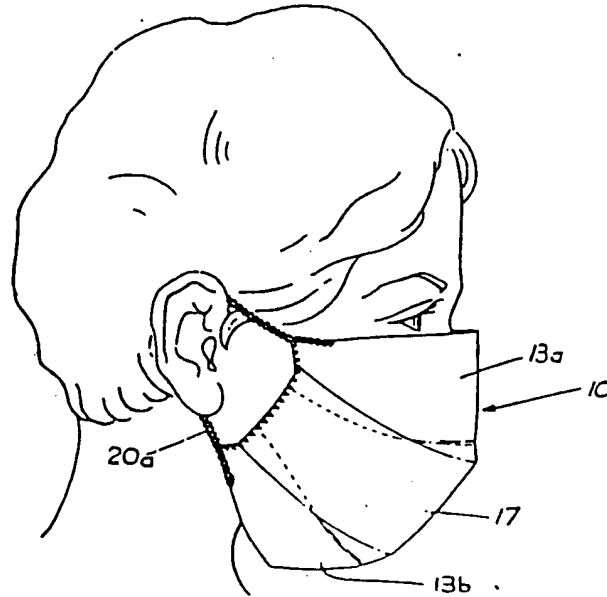


Fig. 1.

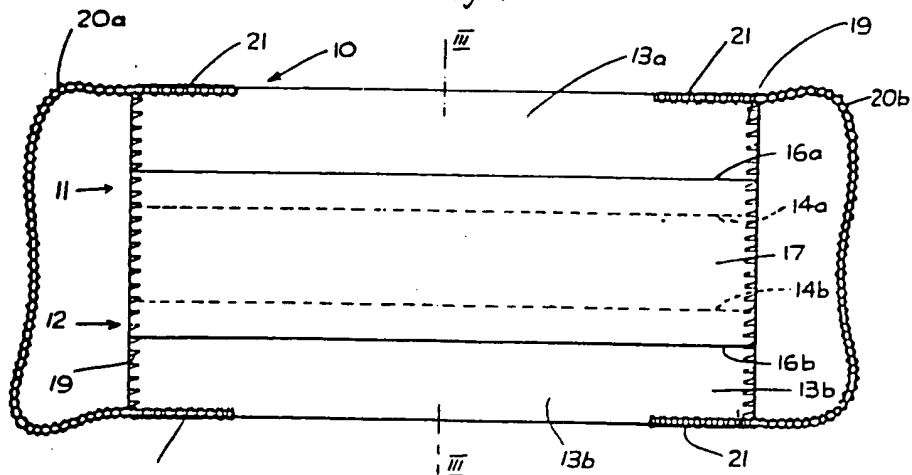


Fig. 2.

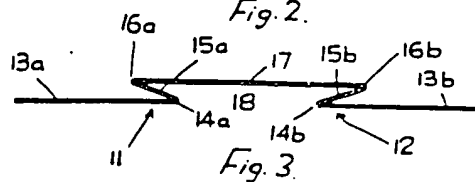


Fig. 3.